

MOVEMENT NEUROSCIENCE

APK 4144 ~ 3 CREDITS ~ SPRING 2020

INSTRUCTOR: **Shahab Vahdat, PhD**
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Preferred Method of Contact: Email

OFFICE HOURS: Office hours are Tuesday 10:30 – 11:30, Thursday 10:30 – 11:30, or by appointment

MEETING TIME/LOCATION: TUR L005, T periods 2-3 (8:30 – 10:25) and
FLG 250, R period 3 (9:35 – 10:25)

COURSE DESCRIPTION: Covers both anatomical and physiological aspects of movement-related components of the nervous system from a functional perspective. Topics include: neuronal signaling; synaptic transmission, somatosensation; proprioception; nociception; vision and eye movements; vestibular; audition; lower vs. upper motor neurons; cortical, basal ganglia and cerebellar regulation of movement; neural repair, cognition, and speech in relation to movement control.

PREREQUISITE KNOWLEDGE AND SKILLS: (APK 2100C and APK 2105C with minimum grades of C) and (sophomore standing or higher) and Applied Physiology and Kinesiology major.

REQUIRED AND RECOMMENDED MATERIALS: **Text Book: Neuroscience Sixth Edition** - Editor: Purves et al.

Textbook website with animations, flashcards, etc: https://oup-arc.com/access/neuroscience-sixth-edition-student-resources#tag_animations

Tutis Vilis Web Page: <http://www.tutis.ca/Senses/index.htm>

COURSE FORMAT: This class is primarily lecture-based with additional in-class demonstrations, discussions, and short videos.

COURSE LEARNING OBJECTIVES: The course provides an in depth overview and treatment of the sensory and motor systems of the nervous system responsible for regulating movement. By the end of this course, students should be able to:

- Describe electric signaling of nerve cells and synaptic transmission as they pertain to movement.
- Elaborate how sensory systems including somatosensory (proprioception, touch, pain), visual, auditory, and vestibular systems, relate to movement.
- Discuss each sensory system's peripheral anatomy and physiology, as well as central brain physiology for processing each type of sensory signal.
- Define the function of lower motor neurons, upper motor neurons, cortical physiology of movements, basal ganglia physiology, cerebellar physiology, posture, and eye movements.
- Understand mechanisms of repair and regeneration, cognition, speech and language motor control, as they relate to movement.
- Students should also be able to integrate across all of the above topics to demonstrate a holistic understanding of how the central nervous system controls movement.

COURSE AND UNIVERSITY POLICIES:

ATTENDANCE POLICY: Although there are no points for attendance, students will greatly benefit from regular class attendance. There will be 6 in-class quizzes throughout the semester to promote attendance and keeping up with reading assignments.

PERSONAL CONDUCT POLICY: Students are expected to exhibit behaviors that reflect highly upon themselves and our University. Students will be expected to engage in class discussions in a manner that demonstrates respect for their peers and their instructor. They will be expected to engage in learning while in the classroom, as opposed to texting, emailing, or reading materials unrelated to the course. Students in this class must adhere to the UF Student Honor Code and will be reported for failure to do so. UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required

or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, as students in this course, you are obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult the instructor in this class.

It is important to the learning environment that you feel welcome and safe in this class; and that you are comfortable participating in class discussions and communicating with me on any issues related to the class. If your preferred name is not the name listed on the official UF roll, please let me know as soon as possible by e-mail or otherwise. I would like to acknowledge your preferred name, and pronouns that reflect your identity.

EXAM MAKE-UP POLICY: Make-up exams and other work can be requested given that there is a medical, family, or other emergency that deems the need for a make-up. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

ACCOMMODATING STUDENTS WITH DISABILITIES: Students requesting accommodation for disabilities must first register with the Dean of Students Office (<https://disability.ufl.edu/students/get-started/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

COURSE EVALUATIONS: Students in this class are participating in GatorEvals. This evaluation system is designed to be more informative to instructors so that teaching effectiveness is enhanced and can be more seamlessly linked to UF’s CANVAS learning management system. Students can complete their evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Thank you for serving as a partner in this important effort.

GETTING HELP:

Please let me know if you are experiencing any personal or academic difficulties this semester. In addition, the following resources are available:

Health and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575
- Counseling and Wellness Center: <https://counseling.ufl.edu/>, 352-392-1575
- Sexual Assault Recovery Services (SARS) - Student Health Care Center, 392-1161

- University Police Department, 392-1111 (or 9-1-1 for emergencies)
<http://www.police.ufl.edu/>

Academic Resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>
- Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. <https://career.ufl.edu/>
- Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <http://writing.ufl.edu/writing-studio/>
- Student Complaints On-Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/> On-Line Students Complaints: <http://distance.ufl.edu/student-complaint-process/>

GRADING:

EXAM 1 (25%)

EXAM 2 (25%)

EXAM 3 (25%) (NOT CUMULATIVE)

QUIZZES (25%)

****THERE WILL BE 6 QUIZZES THROUGHOUT THE SEMESTER**

*****ALL EXAMS INCLUDE TRUE AND FALSE, MULTIPLE CHOICE.**

GRADING SCALE: The instructor will make every effort to post quiz and exam scores on canvas within one week of the assessment.

More detailed information regarding current UF grading policies can be found here:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

Any requests for extra credit or special exceptions to these grading policies will be interpreted as an honor code violation (i.e., asking for preferential treatment) and will be handled accordingly.

GRADE SCALE

A (4.0)	93 – 100%	C (2.00)	73 – 76.99%
A- (3.67)	90 – 92.99%	C- (1.67)	70 – 72.99%
B+(3.33)	87 – 89.99%	D+(1.33)	67 – 69.99%
B (3.00)	83 – 86.99%	D (1.00)	63 – 66.99%
B- (2.67)	80 – 82.99%	D- (0.67)	60 – 62.99%
C+(2.33)	77 – 79.99%	E (0.00)	LESS THAN 60%

WEEKLY COURSE SCHEDULE:

Section 1: Neural Signaling

Week 1

- Jan 7 Chapter 1 – The Organization of the Nervous System
- Jan 9 Chapter 2 – Electrical Signals of Nerve Cells

Week 2

- Jan 14 Chapter 2, 5 – Electrical Signals and Synaptic Transmission
- Jan 16 Chapter 5 – Synaptic Transmission

Section 2: Sensation and Sensory Processing

Week 3

- Jan 21 Chapter 9 – The Somatosensory System Part 1
Quiz 1 (covers chapters 1, 2, 5)
- Jan 23 Chapter 9 – The Somatosensory System Part 2

Week 4

- Jan 28 Chapter 10, 11 – Pain, Vision: The Eye Part 1
- Jan 30 Chapter 11 – Vision: The Eye Part 2

Week 5

- Feb 4 Chapter 12 – Central Visual Pathways
Quiz 2 (covers chapter 9, 10, 11)
- Feb 6 Catch up and Review day

Week 6

- Feb 11 **Exam 1** (covers chapters 1, 2, 5, 9, 10, 11, 12)
- Feb 13 Chapter 13 – The Auditory System

Week 7

- Feb 18 Chapter 13, 14 – The Vestibular System

Section 3: Sensorimotor Control of Movement

- Feb 20 Chapter 16 – Lower Motor Neuron Circuits Part 1

Week 8

- Feb 25 Chapter 16 – Lower Motor Neuron Circuits Part 2
Quiz 3 (covers chapter 13, 14)
- Feb 27 Chapter 17 – Upper Motor Neuron Control Part 1

Week 9

SPRING BREAK

Week 10

Mar 10 Chapter 17 – Upper Motor Neuron Control Part 2
Quiz 4 (covers chapter 16)

Mar 12 Catch up and Review day

Week 11

Mar 17 **Exam 2** (covers chapters 13, 14, 16, 17)

Mar 19 Chapter 18 – Modulation of Movement by the Basal Ganglia Part 1

Week 12

Mar 24 Chapter 18 – Modulation of Movement by the Basal Ganglia Part 2

Mar 26 Chapter 19 – Modulation of Movement by the Cerebellum Part 1

Week 13

Mar 31 Chapter 19 – Modulation of Movement by the Cerebellum Part 2
Quiz 5 (covers chapter 18)

Apr 2 Chapter 20 – Eye Movements and Sensory Motor Integration

Section 4: Complex Brain Functions and Cognition**Week 14**

Apr 7 Chapter 26 – Repair and Regeneration in the Nervous System

Apr 9 Chapter 27 – Cognitive Functions and the Organization of the Cerebral Cortex

Week 15

Apr 14 Chapter 27, 33 – Speech and Language
Quiz 6 (covers chapter 19, 20, 26)

Apr 16 Chapter 33 – Speech and Language

Week 16

Apr 21 Catch up and Review day

**Exam 3 will occur during Final Exam time scheduled for this course (NOT cumulative, covers chapters 18, 19, 20, 26, 27, 33) on Wednesday, April 29, 10:00 am – 12:00 pm

SUCCESS AND STUDY TIPS:

Students that perform best in this class have high attendance and complete the readings prior to class. In addition, students that do not look at their phones or open their laptops during class tend to perform better.